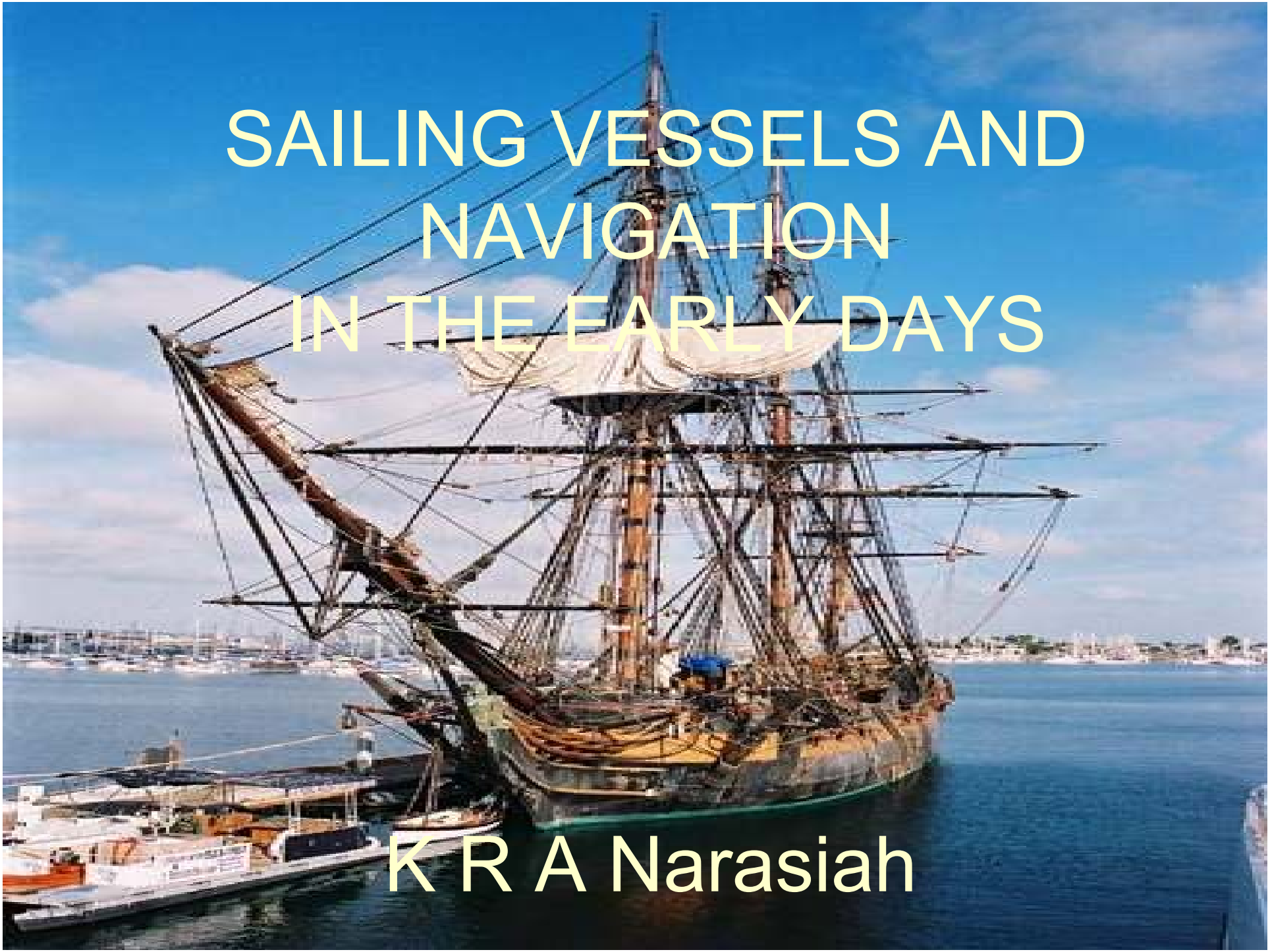


SAILING VESSELS AND NAVIGATION IN THE EARLY DAYS

K R A Narasiah

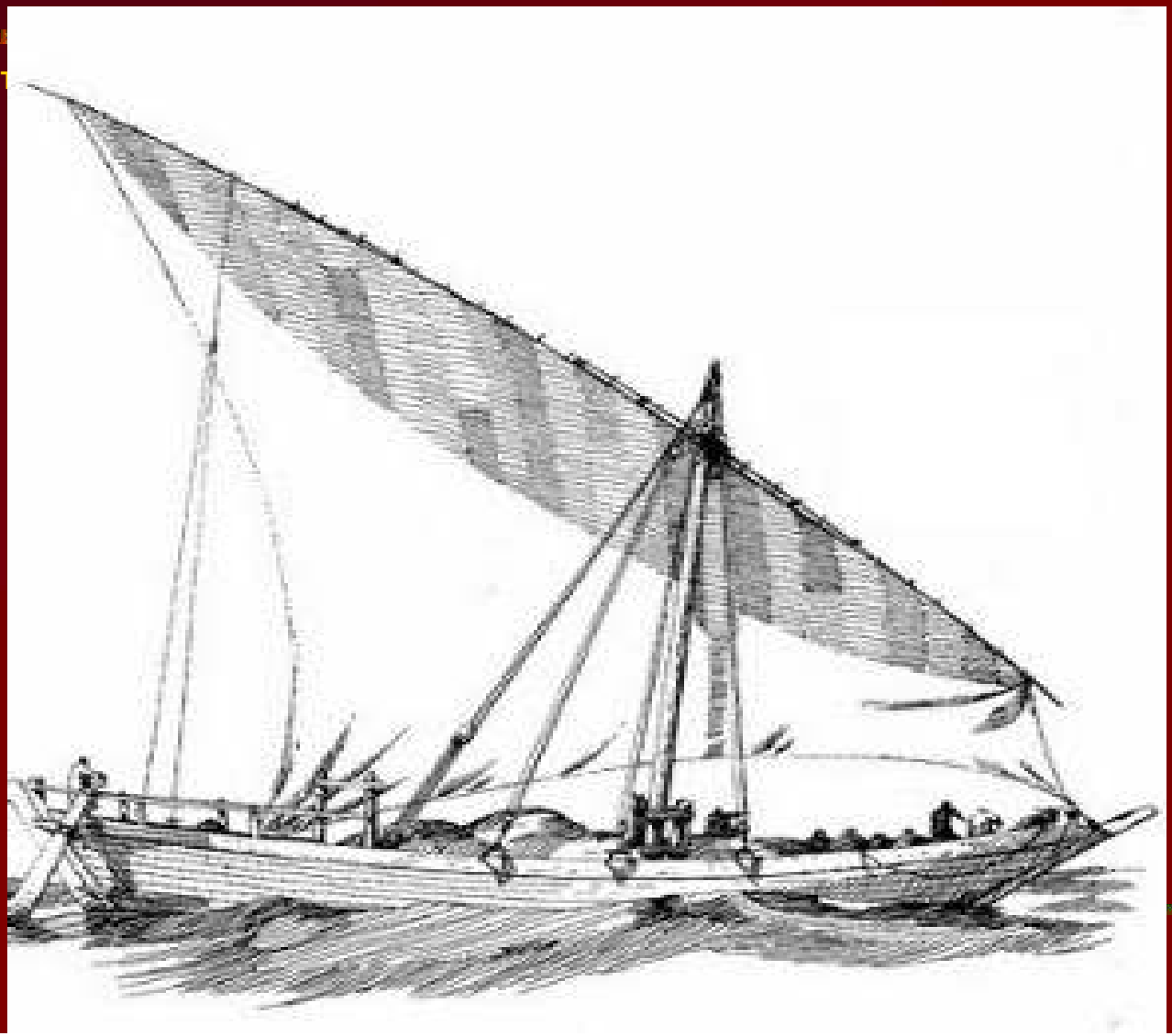
EARLY NAVIGATION

- Today we have all the way at sea
- Earlier sailors did facilities for locating and finding not have any such equipment
- The study is about the way they facilitated their navigation and built their ships

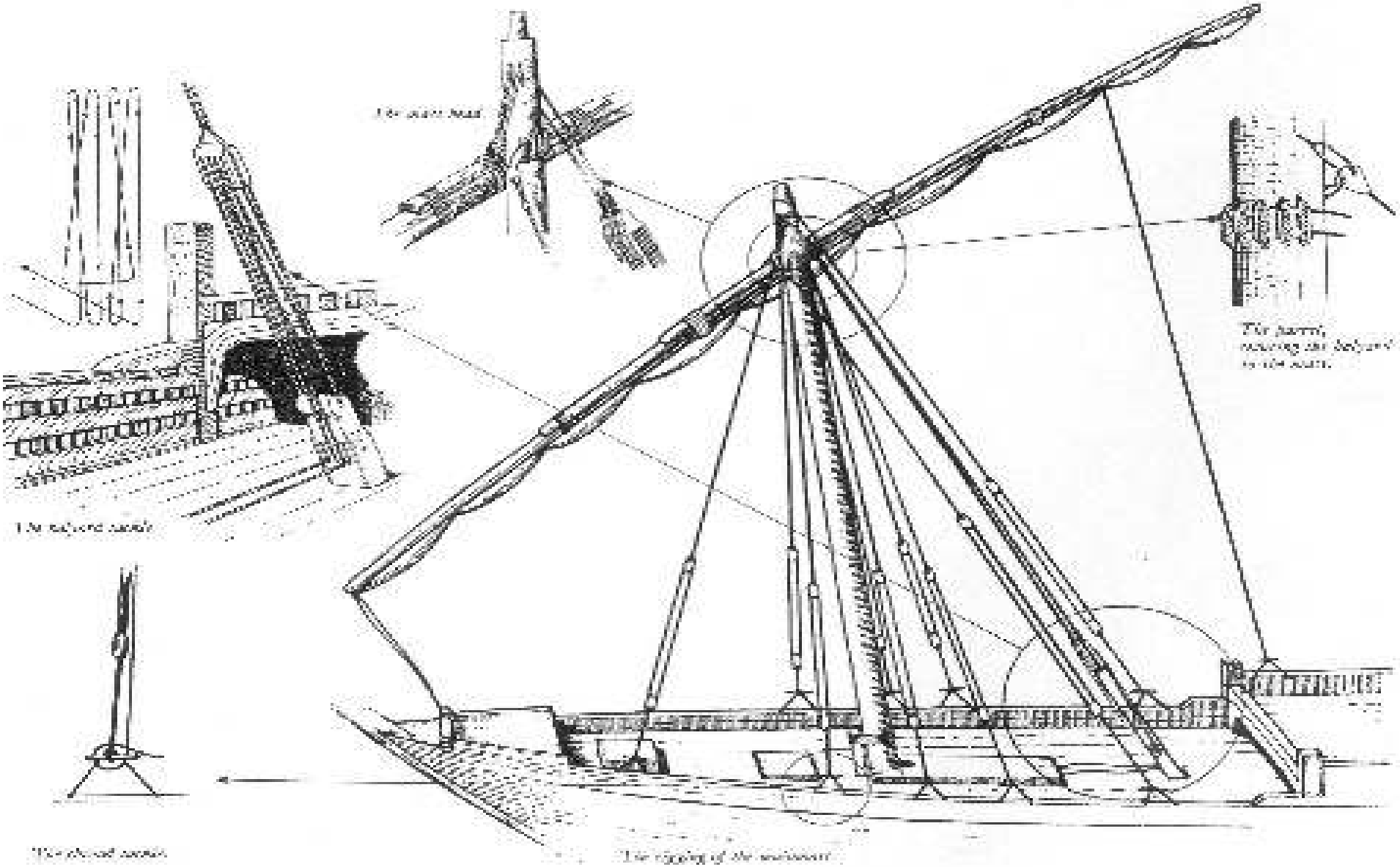
EARLY SHIP TYPES

- Kalam, Naavai, vangam, Kappal
- Kalam is a timber vessel used locally
- Naavai is a ocean going vessel, for distant places
- Vangam is fitted with mast and flies a flag
- Kappal is a later term probably from Telugu

A SEWN BOAT WITH SAIL; NO RUDDER



Rigging of a boat



SHIP BUILDING TECHNOLOGY

- The treatise of Boja Raja “Yukti Kalpa Taru” is considered oldest book on shipbuilding
- The book classifies ships as Saadharana and Visesha
- Specification of materials are given
- Masts are defined

EARLY NAVIGATION

- We now know Hippalus discovered the monsoon winds and their regularity
- Thus a direct passage to India was available from Arabia to Malabar
- The Westerners made good use of it.
- Much earlier Indians had used winds but did not know the regularity

COASTAL NAVIGATION

- Indians used rivers and coasts to sail with available markers ashore.
- Astronomy was used but its start is not dated
- Cholas were the first to go on naval expeditions and their sailors had mastered navigation

PARTS OF OCEAN GOING SHIPS OF CHOLA TIME

- Mast was *koombu* and yard arm *parumal* (corruption of firman of persian*)*
- Rigs were *Alattu* and sails *Pai*
- Rows of side planks were *Vanku-vari* (counted from keel upwards)
- Prow was *Aniya-pirai* and stern was *aniyathu-kattai*
- Stone Anchor was *kal-nanguram* (Langar in persian)
- Mariner's Compass was *machcha yantiram*

TYPES OF TIMBER AND THEIR MEASUREMENT

- Timber is measured in *Muzham* and *Viral (one muzham is 25 virals)*
- The timber were from *Iluppai, Punnai, siru tekku, aini, karimarudu* etc.,
- While fixing the planks various jointing materials were used for waterproofing
- Vessels were built in open beaches
- The builders were *Kammiayars*

TIMBER USED AND REASON

- Teak for planks and other parts, as it was the lightest, self lubricated, impervious to insect and imputrescible.
- Punnai was available in great lengths and straight; crack resistant; flexible and therefore used for masts.
- Crooks used for bends as they are stronger by fibre run
- Teak roots used for pulleys

STEERING THE VESSEL

- Steering was always by the steering oar.
- Sometimes dagger boards were used
- Sukkan or rudder was not introduced till late in the period.
- The reason could be the speed of the vessel or easier methods by oars for smaller vessels

BALANCING AND STEERING

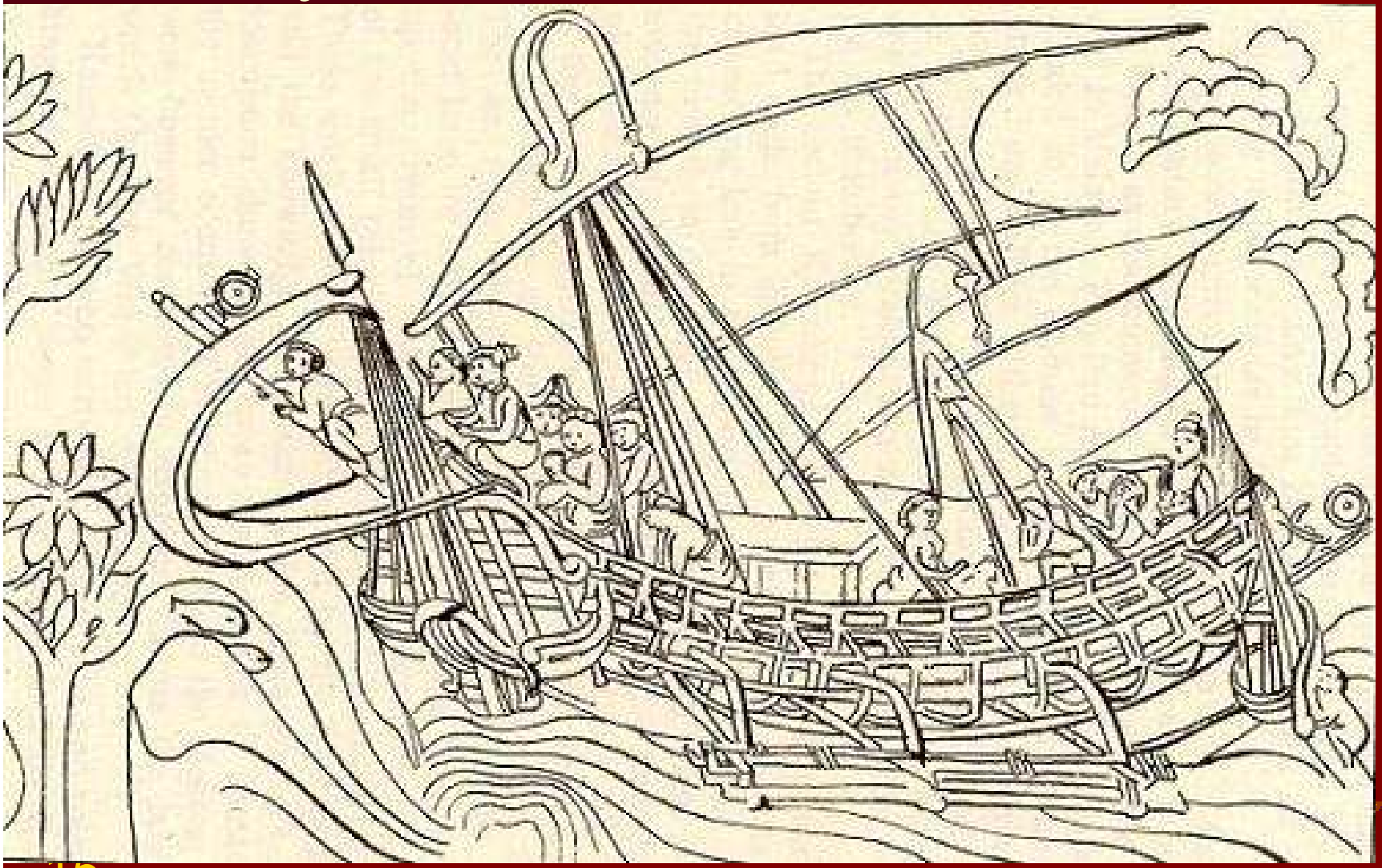
- Leeward is the side sheltered from the wind
- Weather side is the side facing the wind
- Outrigger is A float or a secondary hull projecting from the boat
- Heavy outriggers in the Dhonis were fixed permanently and the ships made thin and long and turned according to the wind

11th and 12th CENTURY BOATS

- All timber construction; two or three masts
- Fore sails were square or rectangular and had trouble in turning
- Lateen sails were not used till late fourteenth century (lateen sails were triangular in shape and at 45° to the mast to control the direction)

Colonizing Java

courtesy K M Panikkar



A bas-relief of a ship in Angkor vat-Chola ship?

SHIPS USED FOR CHOLA INVASION

- We have no definite knowledge of the ships used. We infer from literature
- Periplus mentions two types of Indian vessels: Sangara and kolandiphonta
- Sangara is Sangadam a double canoe used in the coast
- Kolandia is a larger vessel with two masts and pointed ends and an outrigger (as seen in the earlier illustration)
- Kolandia maybe Kulla Dhoni of Tamilnadu

PLACES OF SHIPBUIDING

- An East West coastal stretch from Kodiakkarai to Tondi
- Largest boats were built in Kodiakkarai. Kulla Dhoni (Thief Boat) was a fast boat
- This ship had a transom vertical to the base
- There was a short, heavy balance board outrigger laid athwart the gunwales.

TRADITIONAL BOAT BUIDING CENTRES

- Adiramapattinam, Muthuppettai, Kodiakkarai were the ideal places to build ships.
- There were adjoining islands and villages within a mangrove belt.
- Marshy lands were available and variety of timber too.
- There were traditional boat builders

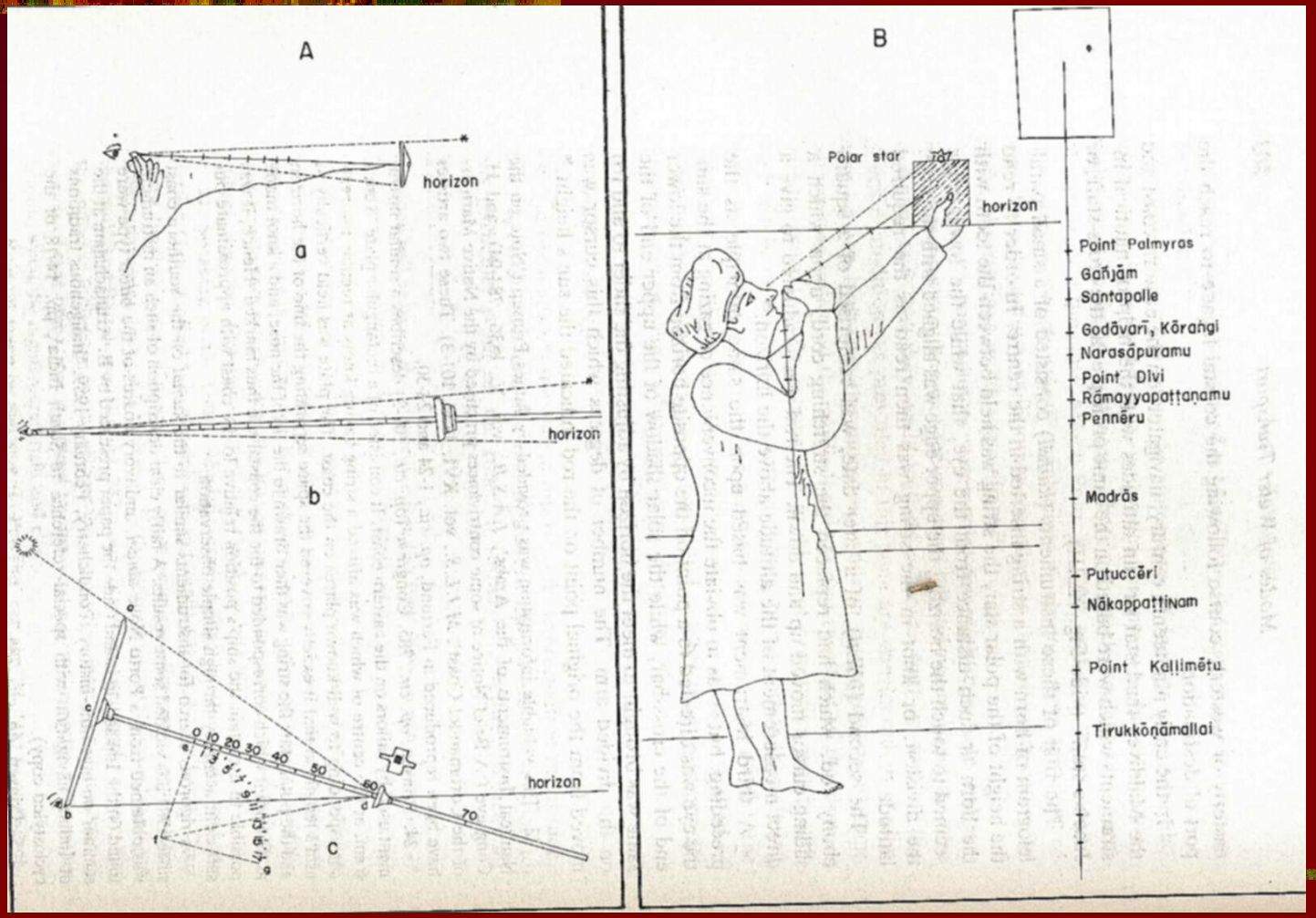
OPEN SEA NAVIGATION

- Coastal navigation was possible through direct observation
- Open sea this was not possible; Specific instruments and procedures were necessary
- Knowledge of astronomy gave sufficient accuracy
- Sun's or stars' AZIMUTH was calculated by practical knowledge.
- Tamed birds were used to show the shore areas.

OPEN SEA NAVIGATION (contd)

- The skill of the navigators who were sensitive to the slightest modification of wind or water.
- As mentioned earlier Macha Yantra was used from early times. (Indian lodestone fish equivalent to Chinese South pointer fish)
- The fish was shaped with its head to South Pole and tail to North Pole
- Indian sailors depended on the southern stars

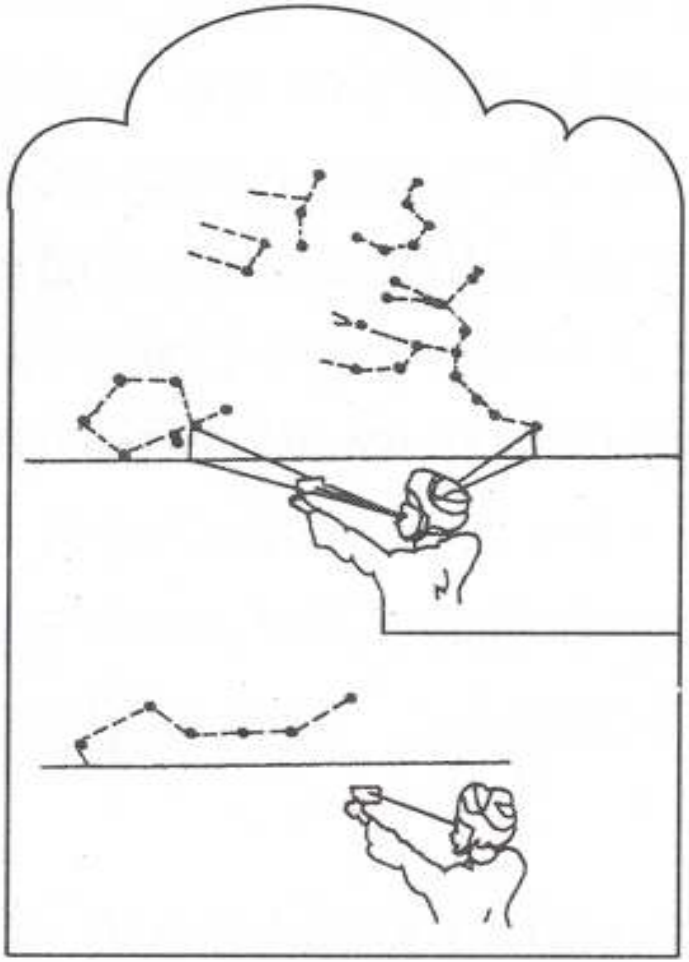
Viral Kanakku slide



Viral Kanakku

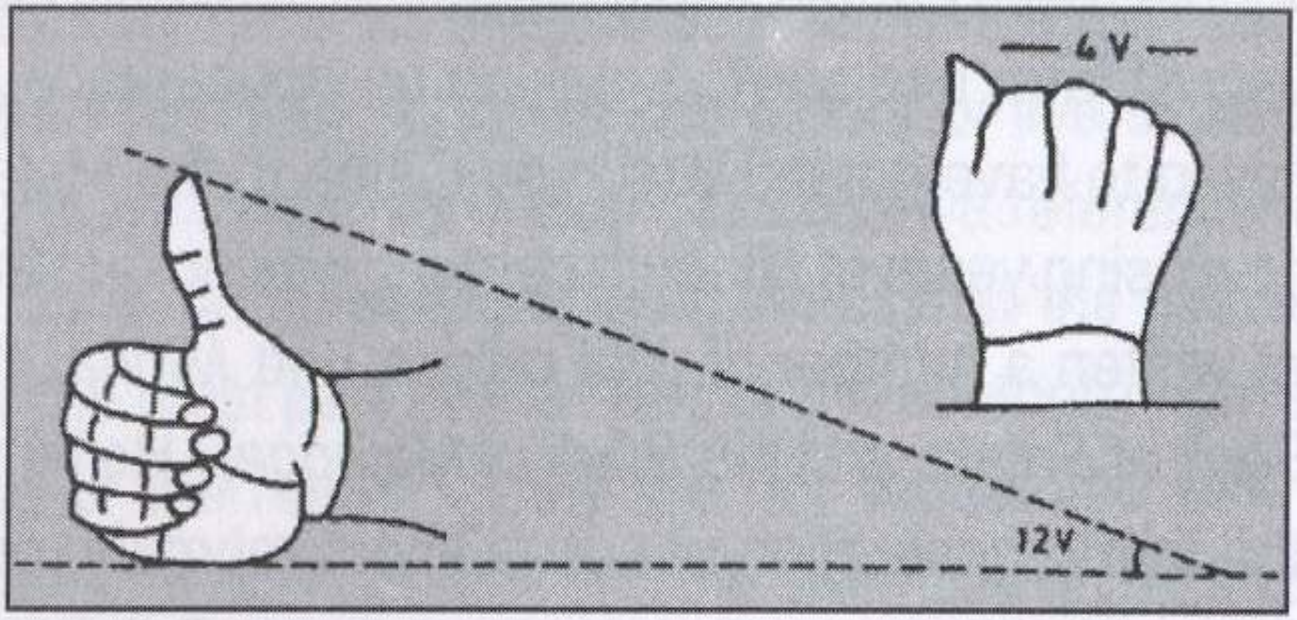
Altitude measurement of stars with fingers

Sighting with Rappalagai



Sighting the star with a Ra-p-palagai

Viral Kanakku



Use of fingers for measurement of stars

CURRENTS OF WATER

- Sailors had plotted the currents of the waters and named them
- The device used for knowing the current was *MITTAPPU PALAKI* (later called tappuppalagai)
- When there is no directional flow it was called *neer-mayam*

Current Roses

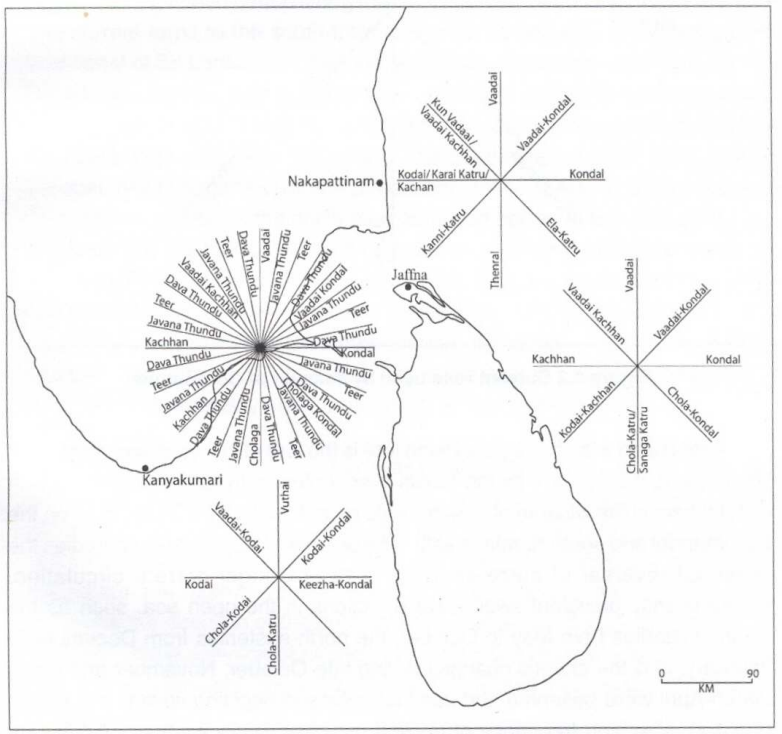


Figure 4.1 Tamil Wind Roses

Chola Navigation Concepts 49

SEASONAL DIRECTION

- South Kaveri delta January and February were the months for outward sailing.
- Sail south wards using *VADAKKAN* later they may have used *MEMARI for Eastward trip.*
- The ports were noted as *YAMAM* distances

Direction of sailing and target ports (KURI)

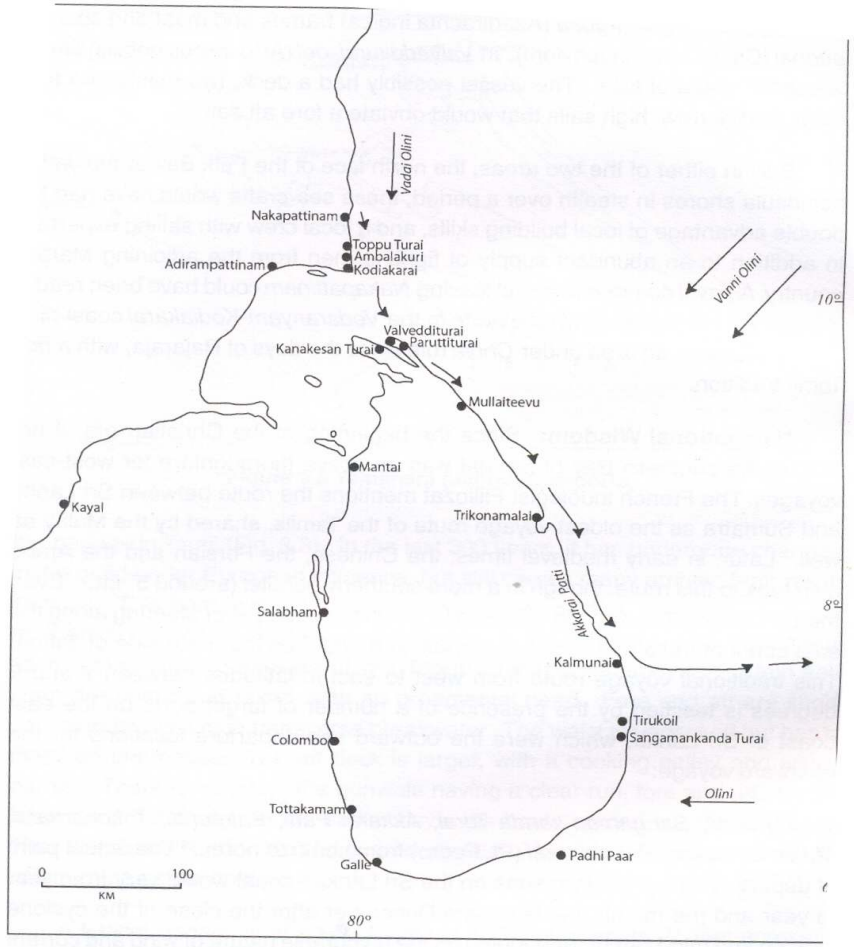


Figure 3.6 Voyage route to Sumatra from the Coromandel coast

STAR NAVIGATION - ASTRONOMY

- Groups of stars were called voyaging stars
- *Shipwatch* was 7.5 *naliagi* (3 hours) I.e., one *YAMAM (eight yamams were one day)* Distances at sea were measured at this quantity
- There were 56 select star / star groups used by Tamil seamen
- The groups and stars have their own local name
- Field knowledge was passed on to the family members orally

STARS AND THEIR EQUVALENTS

TAMIL	INDIAN	ENGLISH
Ottrai Velli	Agastya	Canopus
Nalu Velli	Trisanku	Southern Cross
Ezhu Velli	Saptharishi	Ursa Major
Cemmeen	Ardra	Betelgeuse
Ulakkai Velli	Haran	Orion Belt
Odakkol/Iranai Velli	Punarpoosam/ Poosam	Pollux Castor, Procyon
Vadameen	Arundati	Al Cor

STAR NAVIGATION

- The rise of ARDRA in early January indicates the commencement of sailing season to the East with Arudra darsanam
- Ardra, Margaseeram, araankottai (Kiruttika) Arundati and Tiruvonam were the sailors' stars.
- Ardra and Margaseeram were noted as path finders (Orion group; they rise in the East at dusk in July- August, and at dawn in In December – January.

STAR NAVIGATION (contd)

- In case these two guiding stars are not seen, the bright ROHINI (Alpha Tauri) and Kartik (Pleidas) on the Port bow side and MAKAM on the Starboard provide the guides
- The alternative is SRAVAN as it rises when ARDRA sets, these being near the equator

STAR NAVIGATION (contd)

- Location is based on pole star altitudes; but Pole star is not visible below Kanyakumari
- As the seafarers say it is “LOST” in the haze of visible horizon
- From the Literary records, as per Mr Arunachalam, uthara or Vada Meen was Arundati (Al Cor)

STAR MEASURE

- Kau Nila is the status of the Pole Star
- Kau Kanakku (Star Measure) is used by old seafarers
- This measurement is also called Viral Kanakku
- It is a reference to the altitude of the specific star during the transit of the meridian

MEASUREMENT

- Viral Kanakku in Tamil is the *ANGULI* in Sanskrit (¾ of an Inch)
- Gujarathis used *Dhru* for the same measure
- Arabs called it *Isaba* and Chinese *Chih*

I N S Tarangini – a sailing naval vessel that went around the world